of King's College. Students will enter Westminster Hospital Medical School as in the past, and will remain Westminster men; they will not become matriculated students of King's College, but they will be taught the earlier subjects of study at that institution. The scheme will come into effect at the commencement of next winter session in October. At the same time, the teaching of the subjects of the final examination is being completely re-organised. It is believed that this commencement of a probably more general concentration of the teaching of the preliminary and intermediate subjects of the curriculum cannot but promote the best interests of medical education in London.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 9.—"On some Continuous Observations of the Rate of Dissipation of Electric Charges in the Open Air." By Dr. C. Coleridge **Farr.** Communicated by Dr. C. Chree, F.R.S.

During part of 1902 and 1903 the author resolved to take as many observations of the rates of dissipation of electric charges as possible, and to continue them over the whole day, and, when opportunity offered, over longer periods.

The observations were made on the Canterbury Plains of New Zealand, about 20 feet above sea-level, and five miles due west from the sea coast. The apparatus used was Elster and Geitel's[1] *Zerstreuungsapparat.* Corresponding observations were made of the direction and intensity of the wind (Beaufort), the humidity, and the potential difference between a point about 10 feet above the ground and the earth. This was determined by a Kelvin portable electrometer and a water-dropper.

The dissipation apparatus was read by a telescope, and at night it was illuminated by a bull's-eye lantern, but only during the actual time of reading.

The conductivity of the air is very irregular, but on an average negative electricity is dispersed more rapidly than positive.

$$\text{Taking } q = \frac{\text{conductivity of air for } -\text{ve electricity}}{\text{conductivity of air for } +\text{ve electricity}}:$$

six ordinary days, embracing several hundreds of observations, gave an average of $q = 1{\cdot}16$.

Yet on several occasions for some hours together during these six days, positive electricity was dissipated the more rapidly. The examples considered apparently indicate that a low value for q is, as might be expected, accompanied with a reversal of sign of the atmospheric charge. On one occasion, however, the potential became −185 volts with q about unity.

Again, considering the six days only, as more typical of ordinary conditions than two others to be referred to, there is distinct evidence of a double maximum and minimum value for the conductivity throughout the day for charges of both signs.

Of two other days, viz. February 1 and 2 and December 15 and 16, the former exhibits no distinct maxima and minima, but a strong south-west gale was blowing; the latter day is incomplete.

Observations on February 1 and 2, and on March 1 and 2, during south-west gales gave a much higher value for the conductivity for both positive and negative charges than usual. Since the wind on these two days was in the same direction, there is only a slight amount of evidence that the excessive conductivity is due to the strength rather than to the direction of the wind.

Two days not yet mentioned, viz. February 18 and March 16, may now be referred to. On the first of these a strong gale from the north-west was blowing when the observations were begun. On the latter, at 6.30 a.m., it was calm; at 8 a.m. there was a light south-west wind, and at 9.30 it was blowing strongly from the north-west with a characteristic falling barometer. These "nor'westers" blow over a range of mountains reaching 7000 feet, and deposit their moisture on the western slopes, though the rain often extends to the eastern side. In Christchurch they are invariably dry and hot, being of the nature of "Foehn" winds, and have a depressing effect upon most people.

Though the above days are the only two of the class upon which, so far, the author has taken dissipation observations, yet potential observations indicate that the winds are negatively charged relatively to the earth, which is contrary to the usual condition. On both days the dissipation curves show marked peculiarities. The earliest observation, at 11.15 a.m. on February 18, gave $q = 0{\cdot}4$, with a negative potential difference between water-dropper and earth of −300 volts at 10.20 a.m., −150 volts at 11.40 a.m., and −50 volts at 12.45 p.m. Corresponding with this rise of potential there is also a marked rise in the value of q.

On March 16 the whole history is apparent. At 7.30 a.m. the wind was light south-west, $q = 1{\cdot}3$, potential +90 volts. At 9.45 a.m., wind north-west, strong, $q = 0{\cdot}7$, potential −250 volts. At 10.30 a.m., wind north-west, strong, $q = 1{\cdot}1$, potential −100 volts approximately. The north-west wind seemed then to have thoroughly established itself. The values of q became less and less, the curves indicating the conductivity of the air for positive and negative charges diverging rapidly, that for positive reaching a high value, whilst the negative curve reached remarkably low values. Corresponding with the extremely low value for q the potential reached its greatest negative value, −1885 volts. After this q increased and the negative potential decreased, until at 4.30 p.m. $q = 0{\cdot}94$, potential −30 volts.

March 30.—"On a New Type of Electric Furnace with a Re-determination of the Melting Point of Platinum." By Dr. J. A. **Harker.** Communicated by Dr. R. T. Glazebrook, F.R.S.

The first part of the paper deals with a description of a new type of electric furnace for the attainment in absence of noxious gases of temperatures between 800° C. and 2200° C. The conductor conveying the electric current is a tube of solid electrolytes similar in composition to the filament of a Nernst lamp. An essential feature is that, for many purposes, the usefulness and life of a furnace constructed in this way may be much increased by adopting a "cascade" system of heating. That is, the energy supplied may be divided, so that only sufficient is put through the tubular conductor itself to raise its temperature, say 1000° C. above its surrounding, the surrounding itself being maintained at 1000° C., thus enabling a temperature of 2000° C. to be attained in the tube without straining it unduly.

The regulation of temperature in small furnaces of this type is so perfectly under control that very well defined melting points may be taken with very small quantities of substance.

The second half of the paper deals with a re-determination of the melting point of platinum by the thermo-electric method in these furnaces, the highest value found being 1713° C., the lowest 1702° C., and the mean result of the experiments 1710° C. ± 5° C.

May 11.—"The Effect of Plant Growth and of Manures upon the Soil: the Retention of Bases by the Soil." By A. D. **Hall** and N. H. J. **Miller.** Communicated by Prof. H. E. Armstrong, F.R.S.

The investigation deals first with the variations in the amount of calcium carbonate—the only basic substance usually available in soils—in the experimental plots at Rothamsted. In four of the fields which have been unmanured during a long period, the loss of calcium carbonate amounts to about 1000 lb. per acre per annum. This rate of loss is much increased on some of the manured plots; the use of ammonium sulphate and chloride, as sources of nitrogen, causes an increased loss of calcium carbonate which is equivalent to the amount required to neutralise the acid of the salts applied.

When sodium nitrate is used as a manure the rate of removal of calcium carbonate is lower than on the unmanured plots. Farmyard manure has also a similar conserving effect on the calcium carbonate in the soil. Evidence is also brought forward showing that many soils which are initially very poor in calcium carbonate retain their fertility unimpaired for many years, and even show no decline in the small amount of base they contain, although nitrification is always going on and requires a supply of base from the soil. The authors show, from experiments with water cultures and from a consideration of the analyses of field crops, that the growing plant withdraws more acid than base from the neutral salts dissolved in the soil water, leaving behind a basic residue in the form of bicarbonate. Calcium oxalate and other organic salts in plant residues are converted by bacterial action in the soil into calcium carbonate. These two agencies restore bases to the soil in quantities approximately equivalent to their removal by nitrification, and so maintain a neutral reaction in the soil.

---

[1] Elster and Geitel, "Terrestrial Magnetism," vol. iv., p. 213 *et seq.*

Zoological Society, May 2.—Dr. W. T. Blanford, F.R.S., vice-president, in the chair.—Specimens of domestic chicks to illustrate peculiarities in the hereditary transmission of white plumage: W. **Bateson.**—On *Leucosolenia contorta* (Bowerbank), *Ascandra contorta* (Haeckel), and *Ascetta spinosa* (Lendenfeld): Prof. E. A. **Minchin.** The author pointed out that the nomenclature of the Calcarea Homocoela was in a more tangled state than that of any other group of the animal kingdom, with, perhaps, the exception of the malarial parasites. Dr. Bowerbank, who founded the species, gave a diagnosis that would fit any Ascon, and his type specimens were jumbles of three or four species; consequently Prof. Minchin declared his name to be of no systematic value whatever. To Haeckel's name *Ascandra contorta,* Prof. Minchin referred a sponge extremely abundant on the Mediterranean coasts of France. Prof. Minchin preferred to name *Ascandra contorta,* H., as *Clathrina contorta.* He believed that the *Ascetta spinosa* was only an age variation of *Clathrina contorta,* not yet possessing monaxon spicules.—Anatomy of the ferret-badger (*Helictis personata*), based on a dissection of a specimen that had recently died in the society's gardens: F. E. **Beddard.**—The osteology of the Eurylæmidæ, and the question of the systematic position of this group: W. P. **Pycraft.** While agreeing with the general consensus of opinion as to the primitive character of these birds, the author held that the isolated position which they were supposed to occupy with regard to the remaining Passeres was by no means justified by facts. The pterylography, osteology, and myology of the Eurylæmidæ all tended to show that the nearest allies of these birds were the Cotingidæ. Although undoubtedly primitive, the group, Mr. Pycraft pointed out, presented a number of specialised characters, which were especially marked in the skull and muscles of the wing.

Entomological Society, May 3.—Mr. F. Merrifield, president, in the chair.—A series of *Xenarthra cervicornis,* Baly, from Ceylon, illustrating the curious structure of the antennæ of the ♂: M. **Jacoby.**—Specimens of *Tephrosia consonaria,* ab. *nigra,* and melanic examples of *Boarmia consortaria,* all from a wood in west Kent: G. T. **Porritt.** These forms were exactly on the same lines as the melanism in west Yorkshire, and it is curious they should occur in such widely separate localities. The two genera, however, are evidently prone to melanism, as Mr. Porritt had now seen black, or almost black, specimens of all the British species except *Tephrosia punctulata.*—(1) Two specimens of the very rare Staphylinid, *Medon castaneus,* Grav., taken in the Oxford district during the last week of April; (2) several examples of both sexes of the giant flea *Hystrichopsylla talpae,* Curtis, from field-mouse nests in the same district; (3) the type-specimen of the Bostrichid beetle *Dinoderus ocellaris,* Steph. (taken by the late Prof. Westwood at "Little Chelsea" previous to 1830), from the Hope collection at Oxford: Commander J. J. **Walker.**—Heliotropism in Pararge and Pyrameis: Dr. G. B. **Longstaff.**—The structure and life-history of *Psychoda sexpunctata,* Curtis: J. A. **Dell.**—The three-colour process as applied to insect photography: Dr. D. H. **Hutchinson.**

Mathematical Society, May 11.—Prof. Forsyth, president, in the chair.—The following papers were communicated:—The intersection of two conic sections: J. A. H. **Johnston.** The object of the paper is to determine the number (0, 2, or 4) of the real intersections of two real conics by means of formulæ involving the invariants, or other concomitants of the system. The discrimination depends upon the signs of the coefficients of a certain cubic equation, one root of which can be interpreted, when all the intersections are real, as the area of the quadrilateral formed by them. It is shown that one of the conditions of reality obtained by previous writers admits of very great simplification.—On a system of conics yielding operators which annihilate a cubic, and its bearing on the reduction of the cubic to a sum of four cubes: H. G. **Dawson.**—Informal communications were made as follows:—High Pellian factorisations: Lieut.-Colonel A. **Cunningham.** A method was explained for constructing very large factorisable numbers of the form y^2+1 (with complete resolution into prime factors) from the Pellian equation $y^2-Dx^2=-1$. Examples were given, among them being a number of 78 digits, viz. $(2^{128}+3\cdot2^{42})^2+1$; this was shown to be expressible as $(2^{84}+1)(2^{86}+1)^2$, for which the resolution of the factors $2^{84}+1$ and $2^{86}+1$ had been obtained by Lucas.—The stability of a loaded column: Prof. A. E. H. **Love.** When the column can be treated as a "thin" rod, and the contraction of the longitudinal filaments is taken into account, the critical length is slightly greater than that obtained by the ordinary method, due to Euler, in which this contraction is neglected. The correction of the critical length is found to be $\frac{1}{4}\pi k$, where k is the radius of gyration of the cross-section of the column about an axis through its centroid at right angles to the plane of bending.

PARIS.

Academy of Sciences, May 15.—M. Troost in the chair.—The president announced the death of M. Potier, member of the section of physics.—The permeability of glass vessels: M. **Berthelot** (see p. 88).—The propagation of musical sounds in a tube of 3 metres diameter: J. **Violle** and Th. **Vautier.** Notes of low pitch carry much better than those of high pitch, the distance at which the sound ceases to be clearly a musical note being inversely as the square root of the number of vibrations, this result being in accord with the theoretical investigations of Lord Rayleigh. From a large number of observations the conclusion is drawn that the velocity of sounds of different pitch is the same to an accuracy of 1 part in 1000.—On the menthones and menthols obtained by the reduction of pulegone by the catalytic action of reduced nickel: A. **Haller** and C. **Martine.** Pulegomenthone was obtained when the nickel was maintained at 140° to 160° C.; its physical and chemical properties are given, and there is reason to suppose that the ketone obtained is a mixture of menthones, and further work is being carried out in this direction. By slightly modifying the conditions of the reduction an additional pair of hydrogen atoms is taken up, giving pulegomenthols, two of which, in addition to ordinary menthol, were isolated from the product of the reduction.—On the constitution, saccharification, and retrogradation of potato starch: L. **Maquenne** and Eug. **Roux.** Natural starch is regarded by the authors as a mixture of two substances, distinguished by the names amylocellulose and amylopectine, possessing different reactions towards iodine and malt extract.—The basic magnesium carbonates from the Santorin eruption of 1866: A. **Lacroix.** The structure of this mineral, the quantities of which were too small for quantitative analysis, agrees with that of the basic carbonate $4MgCO_3.Mg(OH)_2.4H_2O$. As this appears to be a new species, the name of giorgiosite is proposed for it.—On the lifting power of a motor-driven helix: **Prince of Monaco.**—M. Louis Henry was elected a correspondant for the section of chemistry in the place of Prof. Williamson.—On a photographic meridian telescope for determining right ascension: Jean **Mascart** and W. **Ebert.**—On the forces giving rise to conical trajectories: Cyparissos **Stéphanos.**—On the electrostatic rigidity of gases at high pressures: Ch. Eug. **Guye** and H. **Guye.** Measurements were made of the explosive potential in gases at varying pressures. The gases studied were nitrogen, air, oxygen, hydrogen, and carbon dioxide, the pressures varying from 2 to 65 metres of mercury. Up to 10 atmospheres, the explosive potential is a linear function of the pressure, but for higher pressures the ratio of explosive potential to pressure diminishes. The results were unaffected by the presence of a radium salt.—On the effects of Foucault currents and the hysteresis of iron on oscillatory sparks: G. A. **Hemsalech.** By means of a photographic method it has been found that the effect of Foucault currents is to augment the frequency of the oscillations per second without influencing the number of oscillations in each discharge. Hysteresis destroys the oscillations and diminishes, more or less, the frequency.—A study of the radiographic power of an X-ray tube: S. **Turchini.** The radiographic effects, as measured by the action on a photographic plate, are found to follow the same laws as the radioscopic effects, and there is reason to suppose that the radiotherapeutic effects will follow similar laws as regards the relation between efficiency and the length of the equivalent spark.—On the conductivity of the gases from flames: Eugène **Bloch.** The ions contained in the gases given off from a flame, at the end of a time sufficiently long take a mobility of the order of 0·01 mm., and hence should be classed as large ions.—On the ionisation and coefficient of magnetisation of aqueous solutions: Georges **Meslin.**—The properties of pyrrhotine in the magnetic plane: Pierre **Weiss.**—On the causes of varieties of halation in photographic plates: A. **Guébhard.**—The triboluminescence of metallic compounds: D. **Gernez.** The luminous effect observed when certain crystals are broken is not, as has been supposed, essentially a property of organic compounds, and a list of seventy-four inorganic compounds is given in which this effect has been observed.—The properties of some anhydrous chlorides of metals of the rare earths: Camille **Matignon.** Details are given of the crystalline form, colour, density, melting points, heats of solution and formation of the chlorides of lanthanum, praseodymium, neodymium, and samarium.—On a reaction of rhodium: Piñerûa **Alvarez.** Chlorine, acting on an alkaline solution of a rhodium salt, gives a characteristic blue colour, due to the formation of sodium perrhodate.—The action of the metal ammoniums on alcohols: a general method for the preparation of the alcoholates: E. **Chablay.** The alkali ammoniums, acting upon a solution of the anhydrous alcohol in ammonia, give a quantitative yield of the alcoholate.—Propionylcarbinol and its derivatives: André **Kling.**—Contribution to the study of the derivatives of benzodihydrofurfurane: A. **Guyot** and J. **Catel.**—On methæmoglobin: M. **Piettre** and A. **Vila.**—Researches on the mode of action of philocatalase: F. **Batelli** and Mlle. L. **Stern.** The name philocatalase is given to a ferment which is present in many animal tissues, although without direct action on catalase it possesses the property of protecting the catalase against the destructive action of anticatalase. The present paper deals with the mechanism of this reaction.—Researches on the comparative power of adhesion of different copper solutions employed as a remedy against mildew: E. **Chuard** and F. **Porchet.**—On a bacterial decay of cabbage: Georges **Delacroix.**—The classification and nomenclature of arable earths according to their mechanical constitution: H. **Lagatu.**—The termination of the motor nerves in the striated muscles of man: R. **Odier.**—On the problem of statical work: Ernest **Solvay.**—On the overlapping strata in the Piedmont zone: Maurice **Lugeon** and Émile **Argand.**—On an extraordinary halo: M. **Pernter.**

DIARY OF SOCIETIES.

THURSDAY, May 25.

Royal Society, at 4.30.—Croonian Lecture, "The Globulins": W. B. Hardy, F.R.S.

Royal Institution, at 5.—Electro-magnetic Waves: Prof. J. A. Fleming, F.R.S.

Institution of Electrical Engineers, at 8.—Wireless Telegraphy Measurements: W. Duddell and J. E. Taylor.

FRIDAY, May 26.

Royal Institution, at 9.—The Development of Spectro-chemistry: Prof. J. W. Brühl.

Physical Society (at the National Physical Laboratory), at 3.30.—The Specific Heat of Iron at High Temperatures: Dr. Harker.—The Measurement of Small Inductances: Mr. Campbell.—Two New Optical Benches: Mr. Selby.

SATURDAY, May 27.

Royal Institution, at 3.—The Evolution of the Kingship in Early Society: Dr. J. G. Frazer.

THURSDAY, June 1.

Royal Institution, at 5.—Electro-magnetic Waves: Prof J. A. Fleming, F.R.S

Institution of Mining Engineers (in the Rooms of the Geological Society), at 11 a.m.—The Firing of Babcock Boilers with Coke-oven Gases: T. Y. Greener.—Compound Winding-engine at Lumpsey Mine: M. R. Kirby.—Note Supplementary to a Paper on the Electric Driving of Winding-gears: F. Hird.—Electric Winding-engines at the Exhibition of the North of France, Arras, Pas-de-Calais: Ed. Lozé.—The Education of Mining Engineers in the United States: Prof. Howard Eckfeldt.—An Outline of Mining Education in New Zealand: Prof. James Park.—Goaf-blasts in Mines in the Giridih Coal-field, Bengal, India: Thomas Adamson.

Linnean Society, at 8.

Chemical Society, at 8.—(1) The Constituents of the Seeds of *Hydnocarpus Wightiana* and *Hydnocarpus Anthelmintica*. Isolation of a Homologue of Chaulmoogric Acid.—(2) The Constituents of the Seeds of *Gynocardia Odorata*: F. B. Power and M. Barrowcliff.—The Relation of Ammonium to the Alkali Metals. A Study of Ammonium Magnesium and Ammonium Zinc Sulphates and Selenates: A. E. H. Tutton.—Camphorylazoimide: M. O. Forster and H. E. Fierz.—Influence of Substitution on the Formation of Diazoamines and Aminoazo-compounds. Part III. Azo-derivatives of the Symmetrically Disubstituted Primary Meta-diamines: G. T. Morgan and W. O. Wootton.—Diazo-derivatives of Mono-acylated Aromatic Para-diamines: G. T. Morgan and Miss F. M. G. Micklethwait.—The Significance of Optical Properties as Connoting Structure; Camphorquinone-hydrazones-oximes; a Contribution to the Chemistry of Nitrogen: H. E. Armstrong and W. Robertson.—Solubility as a Measure of the Change undergone by Isodynamic Hydrazones. (1) Camphorquinonephenylhydrazone. (2) Acetaldehydephenylhydrazone: W. Robertson.—The Design of Gas-regulators for Thermostats: T. M. Lowry.—The Constitution of Barbaloin. Part I.: H. A. D. Jowett and C. E. Potter.—Influence of Substitution on the Formation of Diazoamines and Aminoazo-compounds. Part IV. 5-Bromo-*as*(4)-Dimethyl-2 : 4-diamine-toluene: G. T. Morgan and A. Clayton.—The Action of Hypobromous Acid on Piperazine: F. D. Chattaway and W. H. Lewis.—The Action of Magnesium Methyl Iodide on Pinene Nitroso-chloride: W. A. Tilden and J. A. Stokes.—Racemisation Phenomena during the Hydrolysis of Optically Active Menthyl and Bromyl Esters by Alkali: A. McKenzie, and H. B. Thompson.

FRIDAY, June 2.

Institution of Mining Engineers (in the Rooms of the Geological Society), at 10.30 a.m.—The Conveyor-system for filling at the Coal-face, as practised in Great Britain and America: W. C. Blackett and R. G. Ware.—Underground Fires at the Greta Colliery, New South Wales: J. Jeffries.—The Geology of Chunies Poort, Transvaal: A. R. Sawyer.—Underground Horses at an Indian Colliery: T. Adamson.—Description of the Eimbeck Duplex Base-line Bar: W. Eimbeck.

SATURDAY, June 3.

Royal Institution, at 3.—Exploration in the Philippines: A. H Savage Landor.

CONTENTS.

PAGE

The Anopheles Mosquitoes of India. By Dr. J. W. W. Stephens 73
Exercises in Physics 74
Mathematical Metaphysics 75
British Minerals. By L. J. S. 76

Our Book Shelf :—

Dickerson: "Moths and Butterflies" 76
Stewart: "Second Stage Magnetism and Electricity" 77
Tarazona: "Memoria sobre el Eclipse Total de Sol del día 30 de Agosto de 1905" 77
Otto: "Naturalistische und religiöse Weltansicht" . . 77
Emch: "An Introduction to Projective Geometry and its Applications" 77

Letters to the Editor :—

Fictitious Problems in Mathematics.—**A. B. Basset, F.R.S.; Dr. E. J. Routh, F.R.S.** 78
On the Spontaneous Action of Radio-active Bodies on Gelatin Media. (*Illustrated.*)—**John Butler Burke** 78
The Consolidation of the Earth.—**Rev. A. Irving** . . 79
The Spirit-level as a Seismoscope.—**G. T. Bennett** . 80
A Feather-like Form of Frost. (*Illustrated.*)—**H. M. Warner** 80
The Evolution of Engraving in the Stone Age. (*Illustrated.*) **By A. C. H.** 81
The New Diplodocus Skeleton. (*Illustrated.*) 82
The Masai of East Africa. (*Illustrated.*) **By Sir H. H. Johnston, G.C.M.G., K.C.B.** 83
Notes 84

Our Astronomical Column :—

Newly Discovered Nebulæ 89
The Bruce Telescope Reference Photographs 89
Twelve Stars with Variable Radial Velocities 89
Double "Canals" on Mars in 1903 89
Catalogue of New Double Stars 90
The Royal Society Conversazione 90
Atmospheric Electricity Observed from Balloons. By George C. Simpson 92
University and Educational Intelligence 93
Societies and Academies 94
Diary of Societies 96